WASTE TYRE MANAGEMENT

The 6th Generation full continuous Pyrolysis Equipment & Technical

2020.05.15

I. Overview

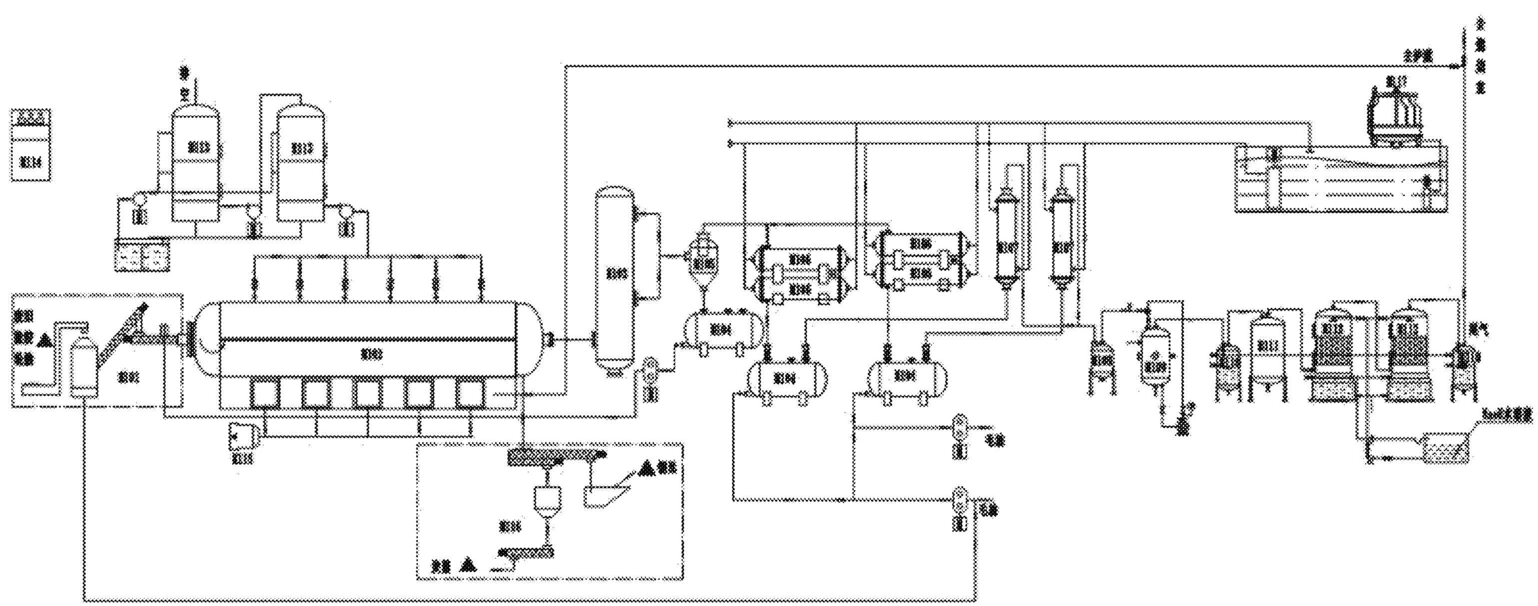
Nowadays, the treatment of waste tires,rubber is a challenge to the modern society. We, Henan DOING Mechanical Equipment Co., Ltd has been specialized in waste pyrolysis equipment and its technology research and development for years. By now we have developed various kinds and series pyrolysis equipments. The 6th generation loop pyrolysis equipment, adopts our self-developed fully continuous production technology, which is specially for processing the waste ,tires,rubber by pyrolysis technology, and to get fuel oil as final product. Meanwhile, the slag charge could be directly burned inside the equipment, thus to save energy and achieve the waste management of "harmless, resource and reduction".

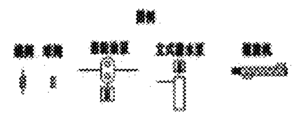
II. Treatment Technology & Equipment

1. Treatment technology – Fully automatic continuous pyrolysis process

For processing the waste waste tires, rubber, we recommend the fully automatic continuous pyrolysis technology with the continuous feeding and slagging process, which could process the waste continuously without stop.

1. Layout





17	M117	凉水塔		1台	
16	M116	出炭器、钢丝系统		1套	
15	M115	[illegible]		1套	
14	M114	配电系统		1	
13	M113	除尘塔		2	
12	M112	喷淋塔		3	
11	M111	汽包		1	
10	M110	水封		2	
9	M109	负压系统		1	
8	M108	汽包		1	
7	M107	冷凝塔		2	
6	M106	列管冷凝器		4	
5	M105	[illegible]		1	
4	M104	油罐		3	
3	M103	分汽包		1	
2	M102	裂解釜		1	
1	M101	进料系统		1套	
序号	流程号	设备名称	型号规格	数量	备注

标记	处数	分区	更改文件号	签名	年、月、日	工艺图	河南东盈机械设备有限公司
设计		标准化				阶段标记 / 重量 / 比例 1:1.5	连续式废橡胶裂解油化生产工艺图
审核							
工艺		批准				共 张 第 张	

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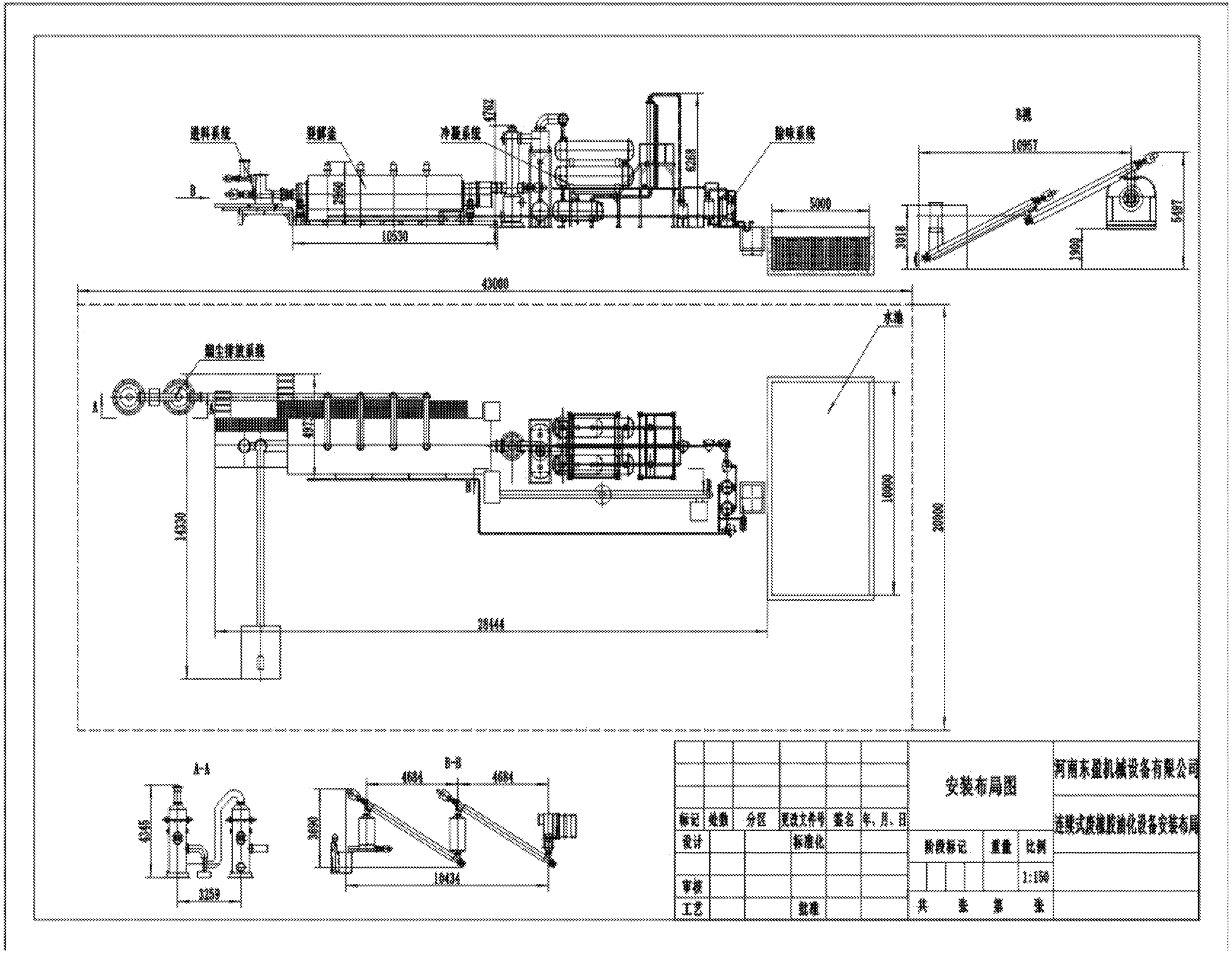
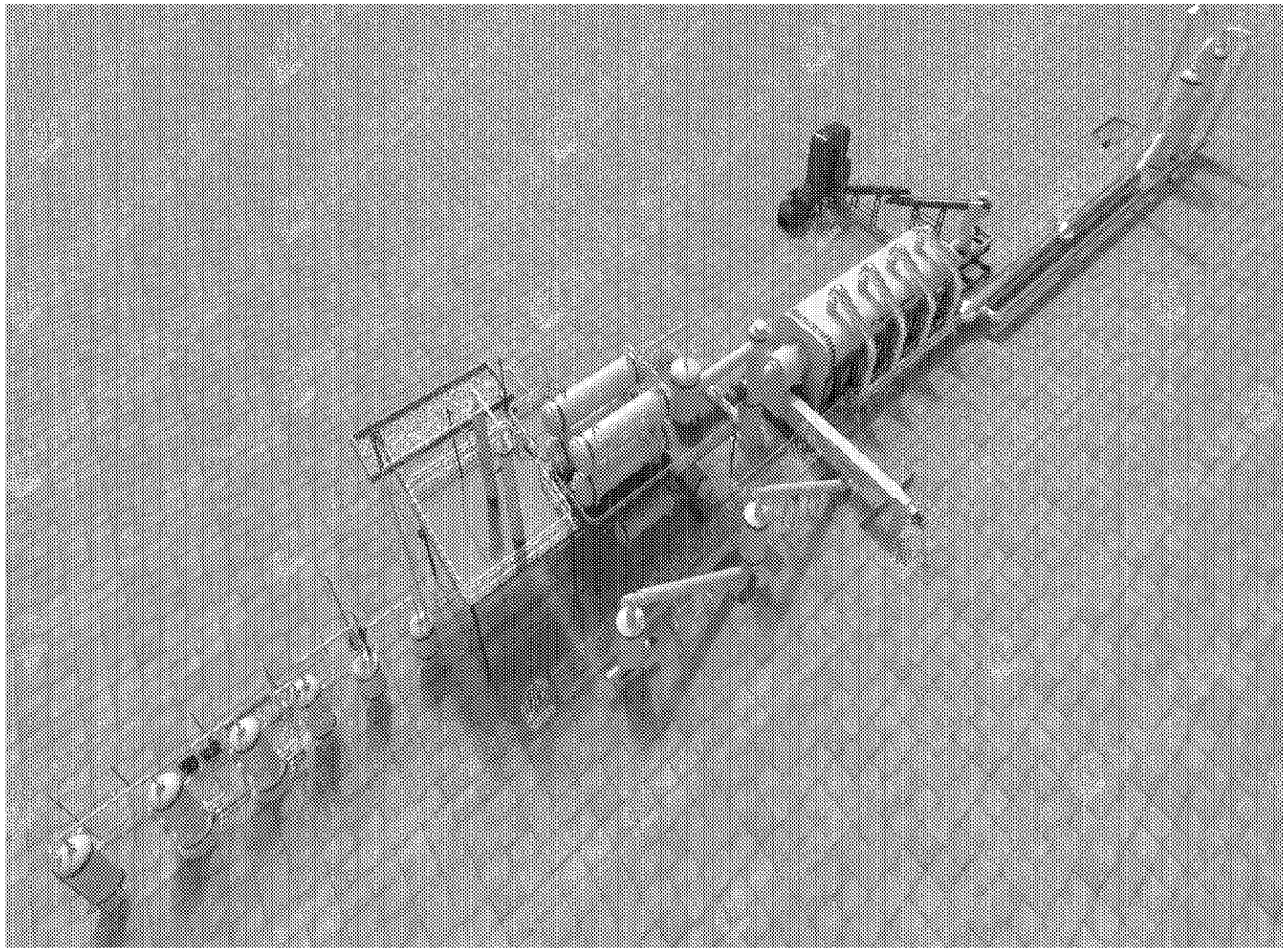
2. Layout



10530
5000
10957
43000
28444
14330
A-A
B-B
4684
4684
10434
3259
安装布局图
1:150

3. **3Ddrawings**

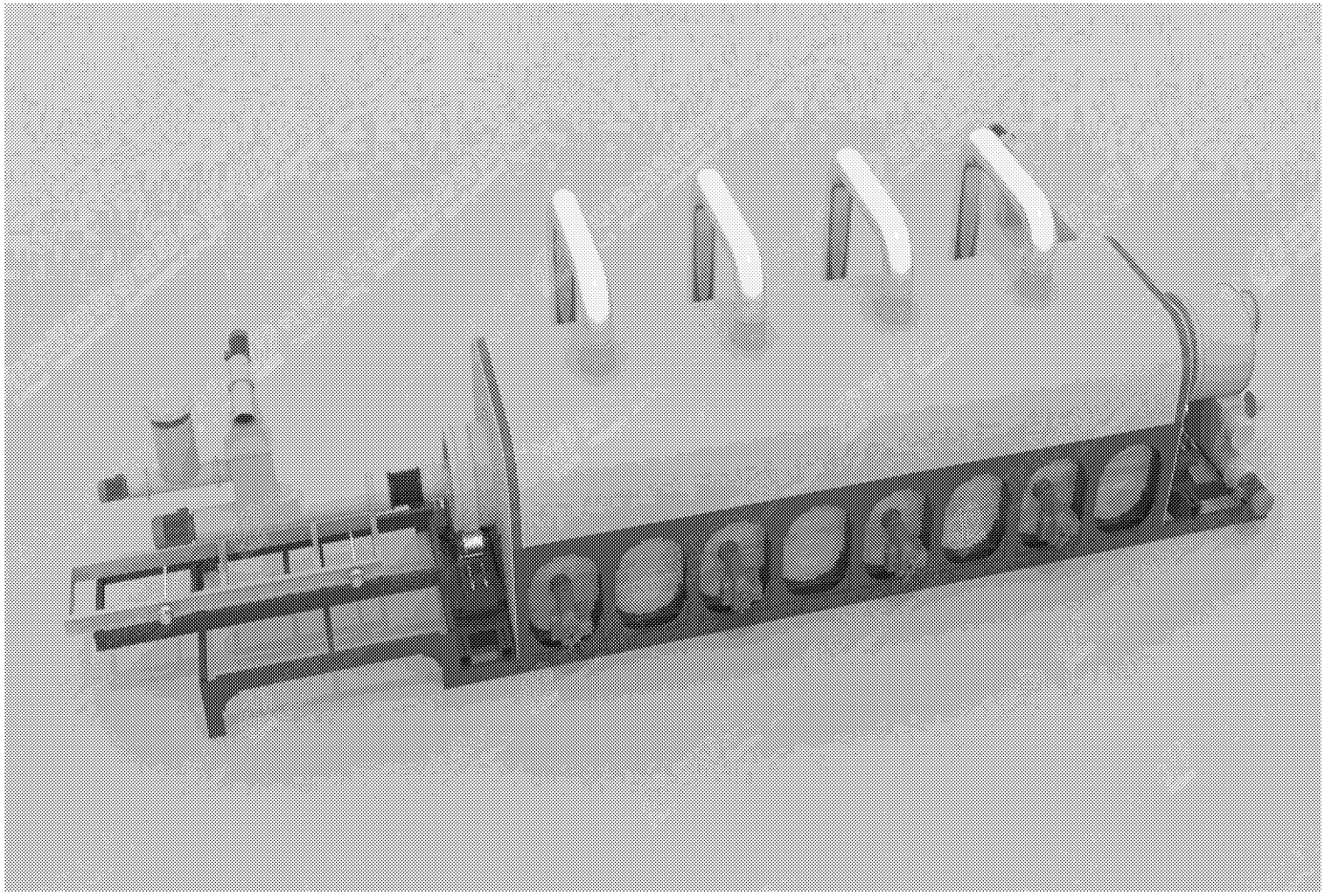


3.continuous pyrolysis machine recommended

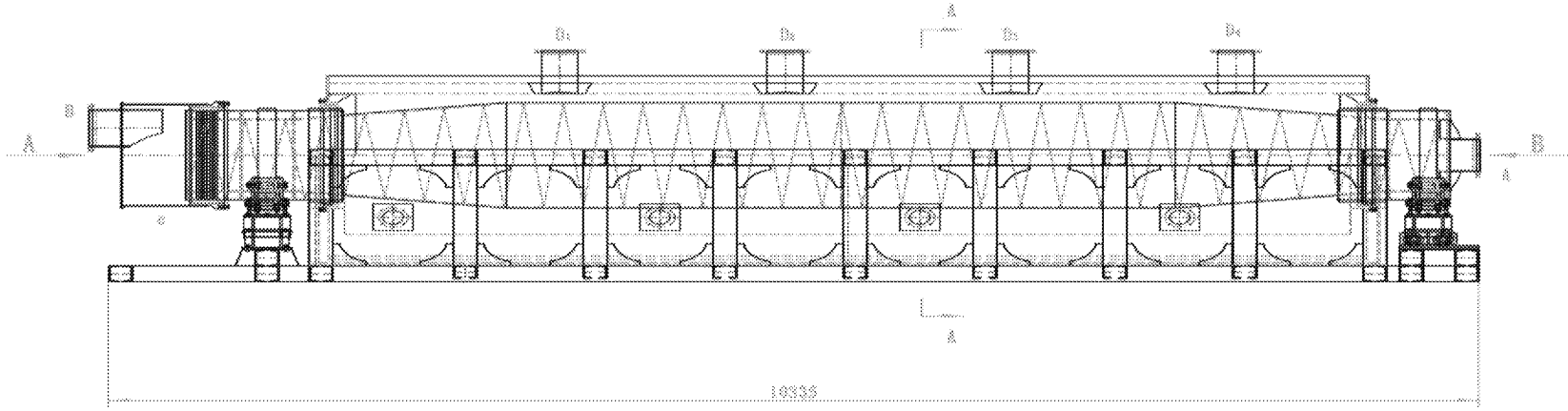
According to the continuous pyrolysis technology, the equipment we recommend in this proposal is the 6th generation updated equipment of our company. It's the new developed process, includes tire crushing system, continuous feeding system, continuous rotating pyrolysis system, continuous slagging system, continuous cooling system, smell removal system,continuous tail gas recycling system, continuous smoke cleaning

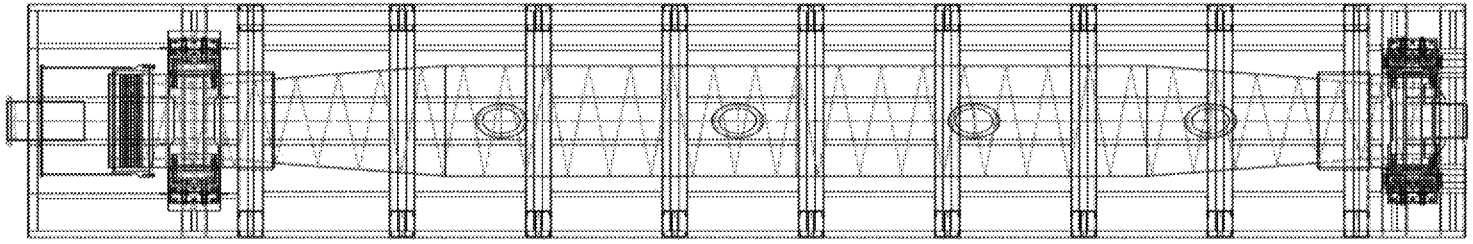
system, etc. The whole pyrolysis process is running under a completely sealed system, which has very high automatic control level, and no need manual operation for feeding & slagging. The fully automatic and mechanical process makes sure the working environment is totally safe and clean.

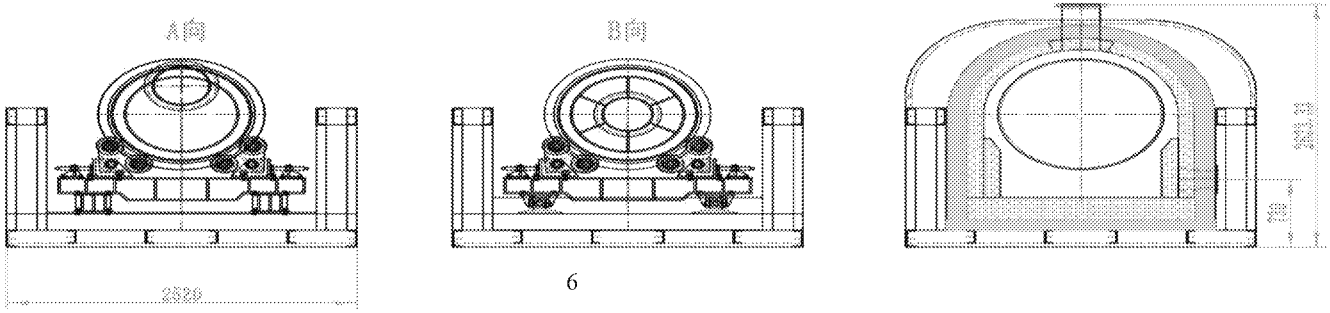
3 D drawing of Continuous Pyrolysis Reactor



View drawings of pyrolysis reactor

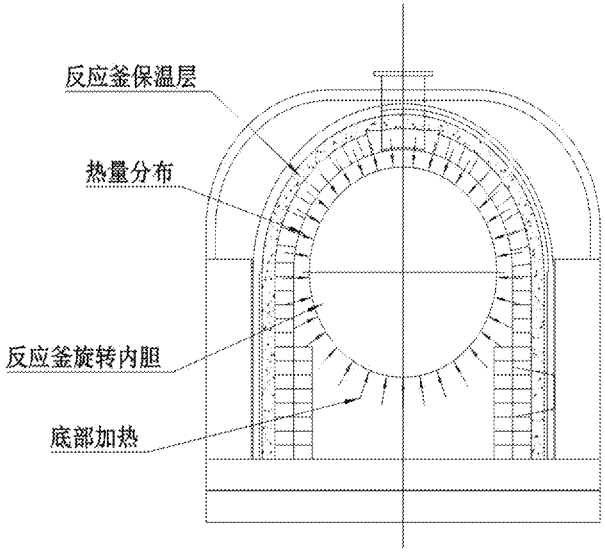




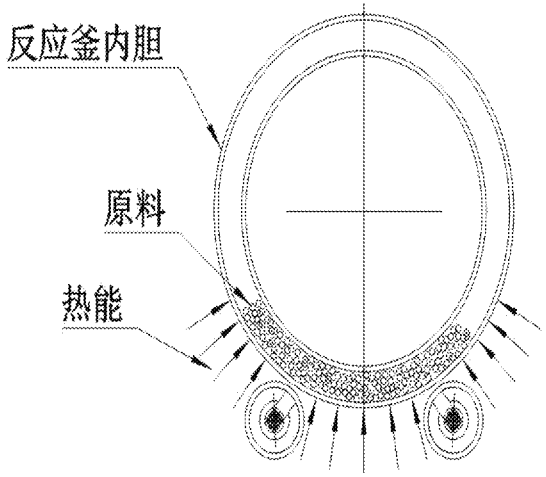


4. The advantages of the 6th generation continuous pyrolysis machine

4.1) To adapt rotation outside and to heat reactor by 360°evenly. Without heating any partial reactor for long time, in this way, our reactor has a longer span life.



Schematic diagram of heat transfer inside reactor



reactor internal raw material dispersion schematic

4.2) spiral vanes are designed inside the reactor, running the raw materials along the inner wall of the reactor. The raw materials are uniformly advanced in the reactor and directly contacted with the heat transfer surface,immediately receiving heat,so heat exchange is quick and evenly distributed.The process of pyrolysis is greatly improved.

4.3).The reactor and feeder drive adopt frequency conversion and explosion-proof motor, which can adjust the residence time of the raw material in the reactor according to the pyrolysis of the raw material in the reactor to achieve the purpose of adjusting the treatment amount and the pyrolysis status, so that the raw material can meet the requirements. In the case of the amount of treatment, it is sufficiently decomposed to increase the oil yield.

4.4). Our reactor can be fed by steel wire-free tire rubber particles and the steel wire-containing tire rubber particles. It can also separate the carbon black from the steel wire when carbon black is discharged, and if The raw materialdoes not include steel wire,then our reactor can increase the processing capacity by 10%, and can be cooled during the process of discharging carbon black and steel wire,and carbon blacks can be directly packaged and collected, the cooling time can be saved, and the production efficiency can be improved.

4.5). while using the burner as a heat source, our reactor recycles the non-condensable flammable gas generated from the tire pyrolysis and passes the exhaust gas burner as the second heat source of the reactor, achieving "self-sufficiency" and saving The consumption of fuel will reduce production costs and increase revenue for customers. In addition, the flue gas after combustion of the exhaust gas is effectively treated to meet the environmental standards for flue gas emissions.

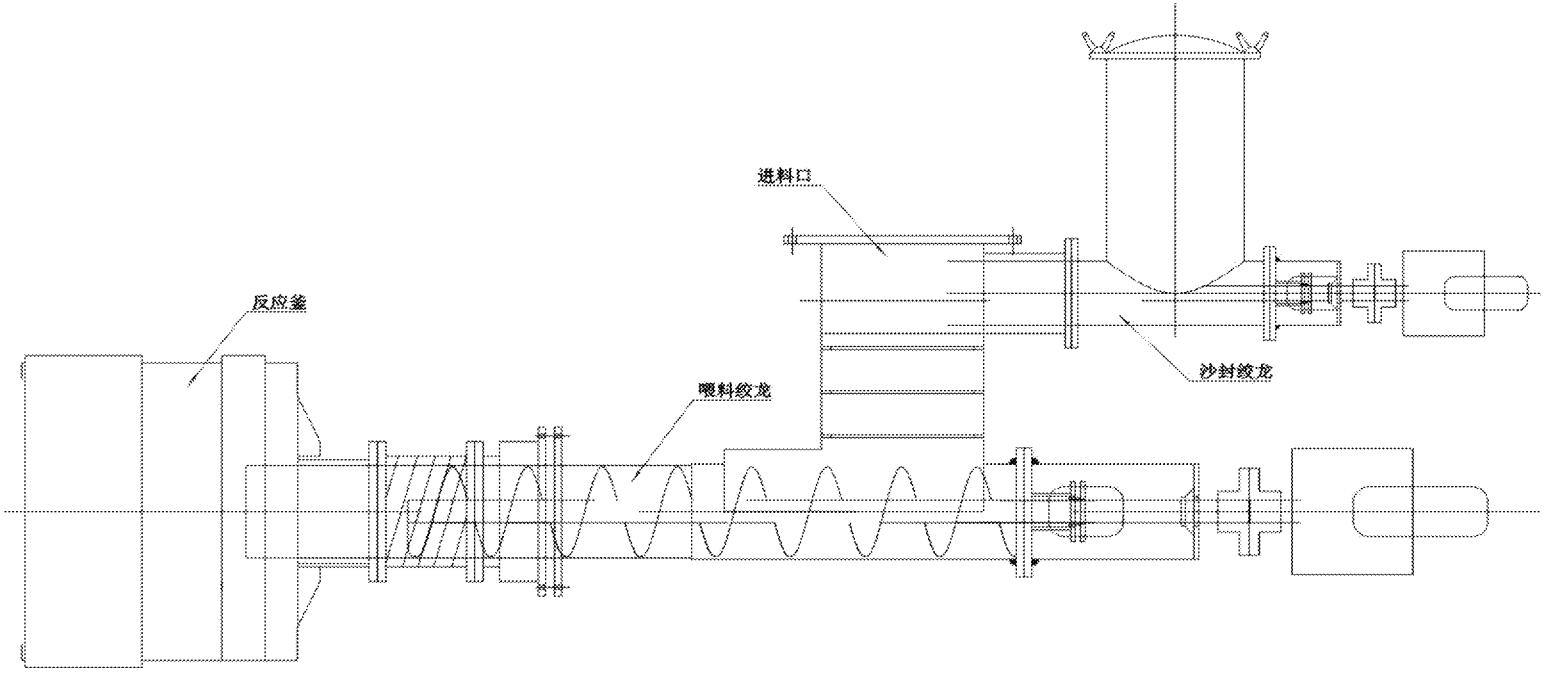
5. Innovative Safety Measures for 6th Generation Equipment

1)Supporting innovation "Our unique leak-proof technology", the key to this technology is the invention of "special" sealing methods and structures. The key to full continuous pyrolysis process is the continuous supply of raw materials to the reactor during the pyrolysis process of the reactor, and the slagging and prevention of pyrolysised oil and gas from leaking through the feed inlet and slag outlet. In response to this, our company is supporting innovative method of combining the sealing box at the feeding and the interlocking sealing device of discharging with sealing graphite to prevent oil and gas from leaking during production and ensuring safe production

2) Supporting innovation "Sand sealing safety auger structure", if there is a special case of leakage between the feed end and the feeding auger

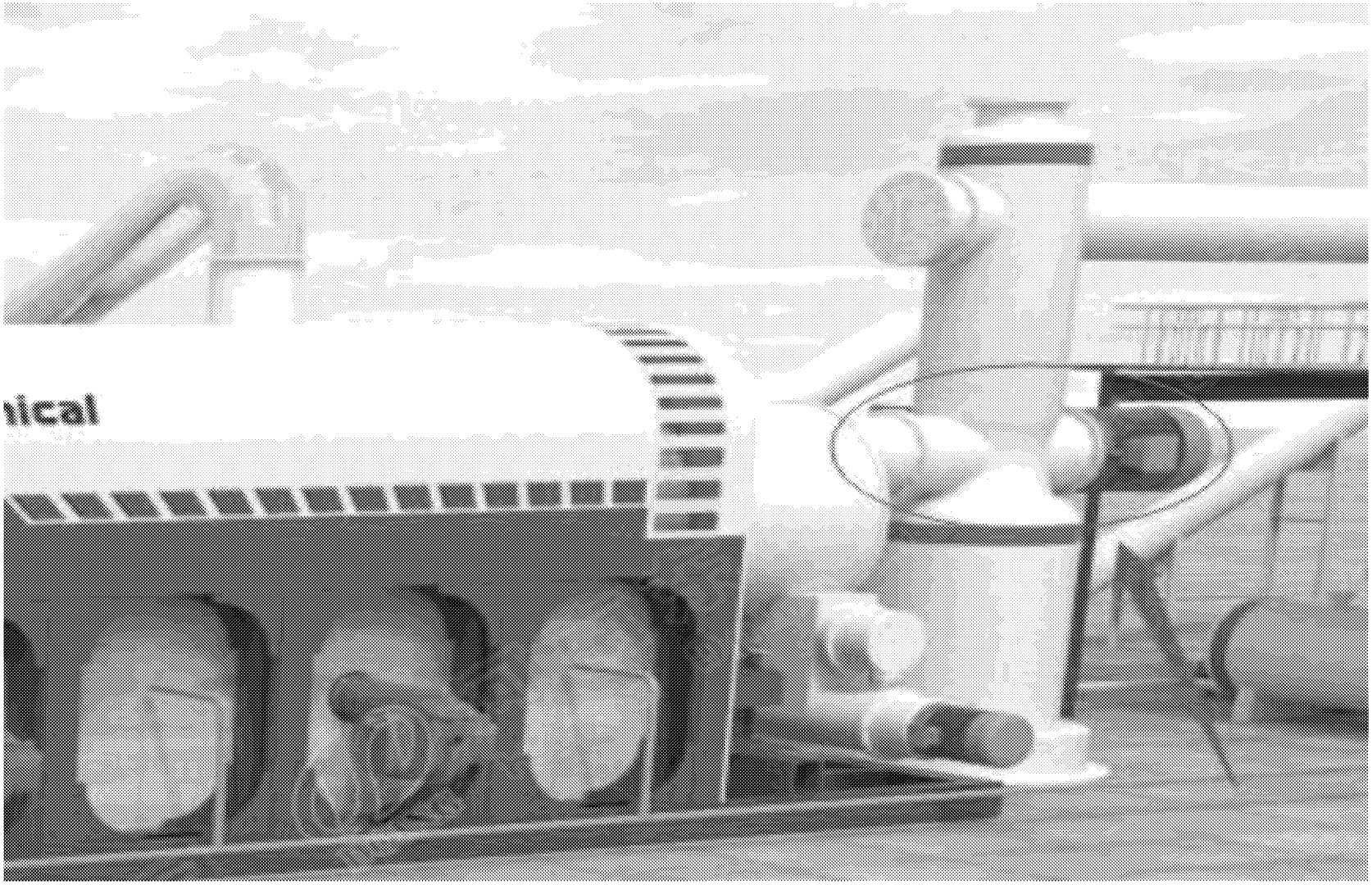
feed inlet during the actual production process, the inlet part of the reactor can be completely sealed to avoid Oil and gas continue to overflow in the feed direction along the feed port to prevent serious conditions from occurring. Then, in the case of suspension of maintenance, if there are oil and gas residues in the reactor, to prevent oil spills in the reactor during the inspection process, the original feed port will be plugged to ensure safe maintenance and prevent all accidents from occurring.

Sand sealing safety auger structure



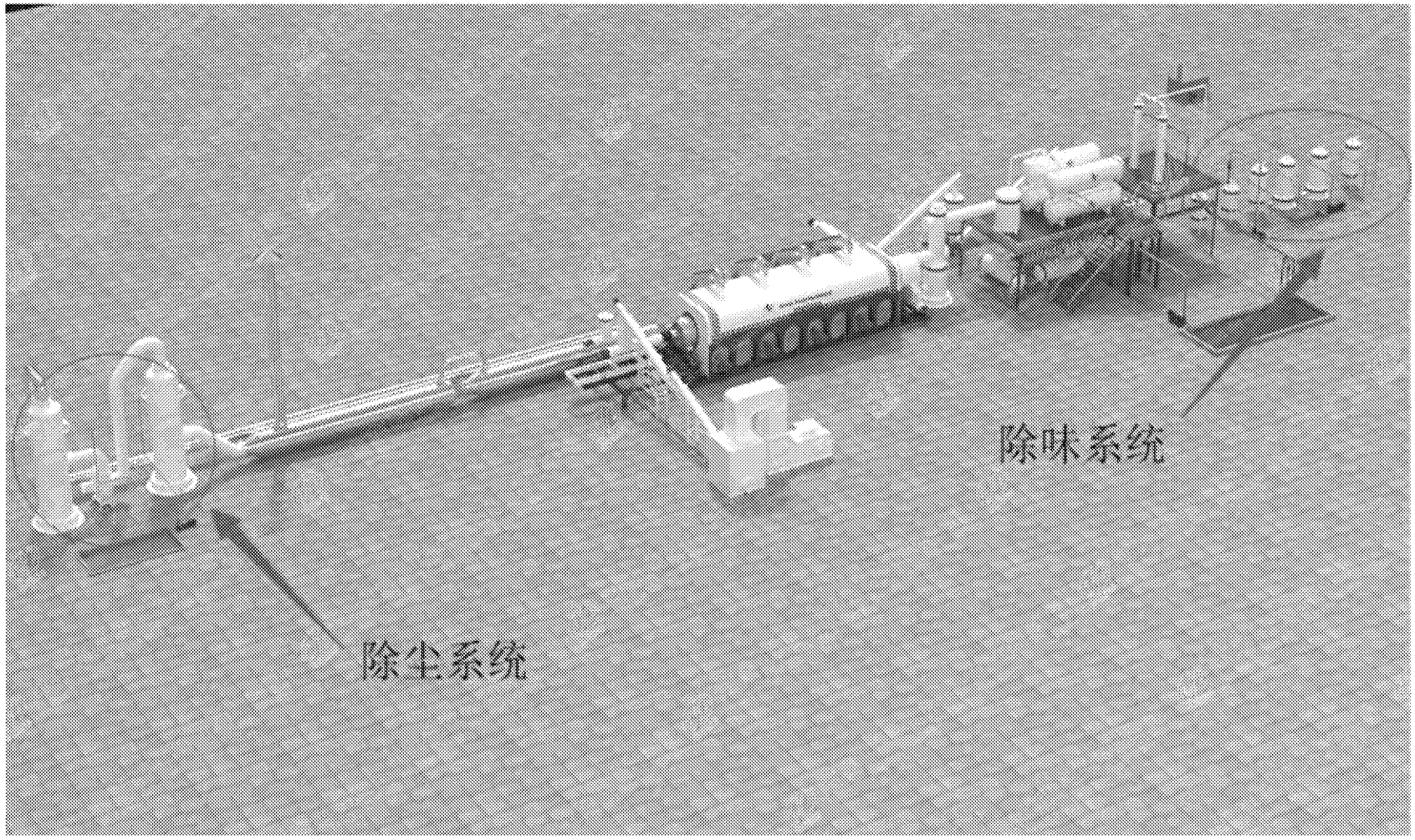
5.3)Supporting innovative "carbon black exhaust anti-blocking " device. In order to prevent the carbon black powder entangled in oil and gas in the reaction vessel from accumulating in the wall of the gas outlet to cause blockage during the process of oil and gas discharge, the pressure in the reactor is increased due to poor gas outlet, and a special scraper is installed at the outlet port of the reactor. The wall twister can not only periodically start the carbon black sticking on the pipe wall and push it back into the reactor, but also does not interfere with the normal

discharge of oil and gas, and does not need manual regular cleaning to ensure the continuity and safety of production. carbon black exhaust anti-blocking " device



5.4).Supporting innovative "deodorant + dedust " dual tail gas treatment system. After using this technology, the non-condensable flammable gas produced in the process of generation can be deodorized to remove the harmful gas with irritating odor. After the initial purification, the non-condensable flammable gas heat the reactor as a supplementary heat source. The generated dusty flue gas passes through the dust-removal tower to eliminate the harmful gas components and fumes in the flue gas to reach the environmental protection standard.

Deodorant + dedust dual tail gas treatment system



5.5). The condensing equipment of our company's production line adopts a tube-type condenser design. The uncondensed oil and gas are taken in the tube, the water is taken away from the tube to exchange heat, the water and oil are in zero contact, and the cooling water can be recycled (with a 50m3 cooling pool). To achieve zero discharge of wastewater. Both environmental protection and can guarantee the cooling area, so that oil and gas can be fully cooled and collected.

5.6). Our company's production line uses a micro-negative pressure process. The main advantage is that it can ensure that the pyrolysis oil and gas continue to move to the rear of the production system, preventing the condensed gas from flowing back to the reactor, causing secondary heating and re-cracking to achieve energy conservation and improve oil quality. To reduce losses, such a production process will reduce the production cost by about 15%, and the pressure in the system will not be formed, and the safety of the system operation will also be guaranteed.

III. Technical Parameter of continuous pyrolysis plant

1. Physical and chemical parameters and technical reference.

2. Consuming data

Item	Technical data	Remark
Raw material: tire	45%	
Status of slage	Carbon black and ash	
Smoke emmission	Standard	
Capacity	2.08T/H	

Item	Each ton material	Illustration
Fuel consumption	20-30kg/ton	According to waste gas and oil yield rate of the material, some times need this extra fuel, some times no need.
Daily capacity	50T	
Water consuming	Cooling water：0.01T	Evaporation loss
	Dedusting water：0.1T	Consumption loss

3. Some other reference

Item		Reference
1	Working method	Fully automatic, no stop even a second.
2	Reactor Structure	The 6th generation, external reactor rotate. Material move inside reactor through a guiding device.
3	Reactor size	according to real material
4	Reactor electricity consumption	96 KW
5	Heating method	Indirect heating, no direct fire to reactor
6	Heating resource	Oil, recycled waste gas.
7	Cooling method	Recycling water (water consumption: 10 kg/t Evaporation loss)
8	Sealing	Both hard and soft sealing. Mainly use soft sealing.
9	Control method	Intelligent, variable frequency automatic control +manual operation: also can be made full PLC system without any manual control according to customer requirement(price of this need to discuss)
10	Area	1200m²
11	Application	/
12	Reactor material	Q345R (stainless steel is available with different price if required)
13	Machine life	7-10 years

4. Devices in the 50t capacity continuous pyrolysis system

Including: feeding system, pyrolysis system, heating system, discharge system, heat exchange system, oil collecting system, waste gas purification system, smocking cleaning system, control system etc.

Detailed list of the machine:

NO.	Name	Specifications	Quantity	Unit	Remarks
1	Reactor heating furnace base	2450*11500*1800	set	2	
2	Upper shell of heating furnace	2450*11500*1300	set	2	
3	Main reactor	Ø1600*26000	set	1	
4	Reactor slag head and grade 1 slag screw conveyor	Ø1750*1250; Ø425*2800	set	1	
5	Grade 2 slag screw conveyor	Ø425*7500	set	1	
6	Grade 3 slag screw conveyor	Ø425*7500	set	1	
7	Lifting screw conveyor	Ø425*7500	set	1	
8	Feeding screw conveyor	Ø425*6000	set	1	
9	Oil and gas receiving separation tank	Ø1400*3750	set	1	
10	Heavy oil receiving tank	Ø1000*3000	set	1	
11	Light oil receiving tank	Ø1000*3000	set	1	
12	Class 1 condensation tank	Ø1200*3750	set	1	
13	Class 2 condensation tank	Ø1200*3750	set	1	

14	Class 1 dry gas fire retardance pot	Ø800*1500	set	1	
15	Class 2 dry gas fire retardance pot	Ø800*1500	set	1	
16	Class 3 dry gas fire retardance pot	Ø800*1500	set	1	
17	Class 1 smoke quenching tower	Ø1900*6000；SUS304	set	1	
18	Class 2 flue gas denitrification tower	Ø1900*6000；SUS304	set	1	
19	Class 3 flue gas desulfurization tower	Ø1900*6000；SUS304	set	1	
20	Central electrical control cabinet	1300*500*2000	set	1	
21	Flue gas induced draft fan	30KW Boiler induced draft fan	set	1	
22	Oil pump	3KW	set	1	
23	Water pump	1.5KW，3sets；5.5KW,1set	set	4	

24	Homemade burner	300,000 kcal	set	8	For rec recycling dry gas
25	Main reactor gear motor	11KW-6P	set	1	
26	Lifting screw conveyor gear motor	5.5KW-4P	set	1	
27	Feeding screw conveyor gear motor	7.5KW-4P	set	1	
28	Grade 1 slag screw conveyor gear motor	7.5KW-4P	set	1	
29	Grade 2 slag screw conveyor gear motor	11KW-4P	set	1	
30	Grade 3 slag screw conveyor gear motor	7.5KW-4P	set	1	

- **Remark:**

1.The price is based on FOB Qingdao port, not including shipping freight, factory building and workers' training.
2. Delivery time- It will be 50 working days after we receive the deposit(already no machine in stock at the moment).
3. Warranty- one year, expect wearing parts and man-made damage.
4. After sales service:

- Installation and Training-Our company will send one engineer for guiding your machine installation, testing the machine and training your workers. During installation, buyer should pay engineer salary $100 each day when installation, and $300 each day when commissioning and training. And buyer should take charge of technician round trip air tickets and accommodation.

- For the quote: will make the further discuss while we travel there, Rodney pls gives the target price for a reference and it will help us to find the right person discuss with them face to face .

- May 15, 2020